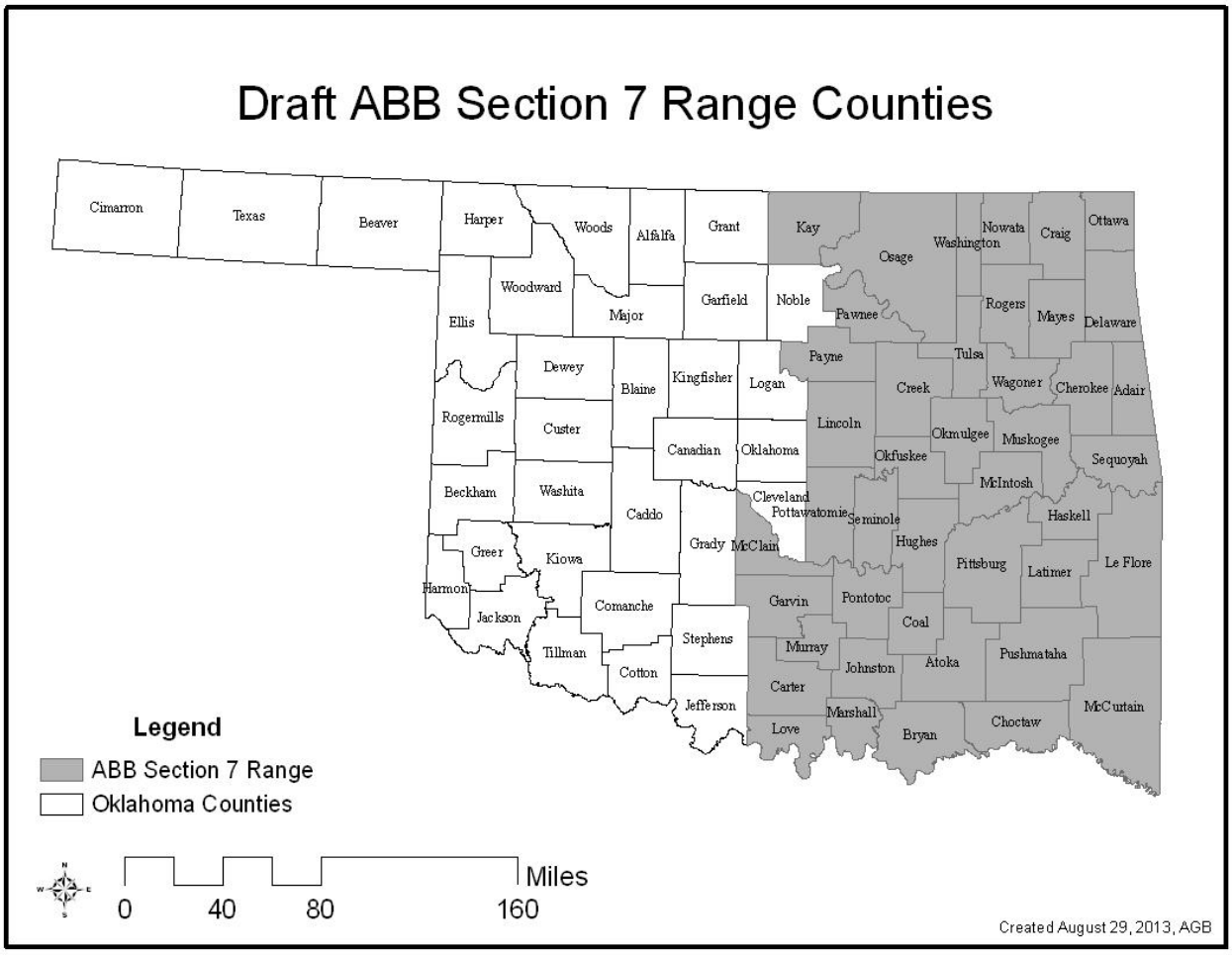
Notes from ABB Science discussions August 12-?, 2013-

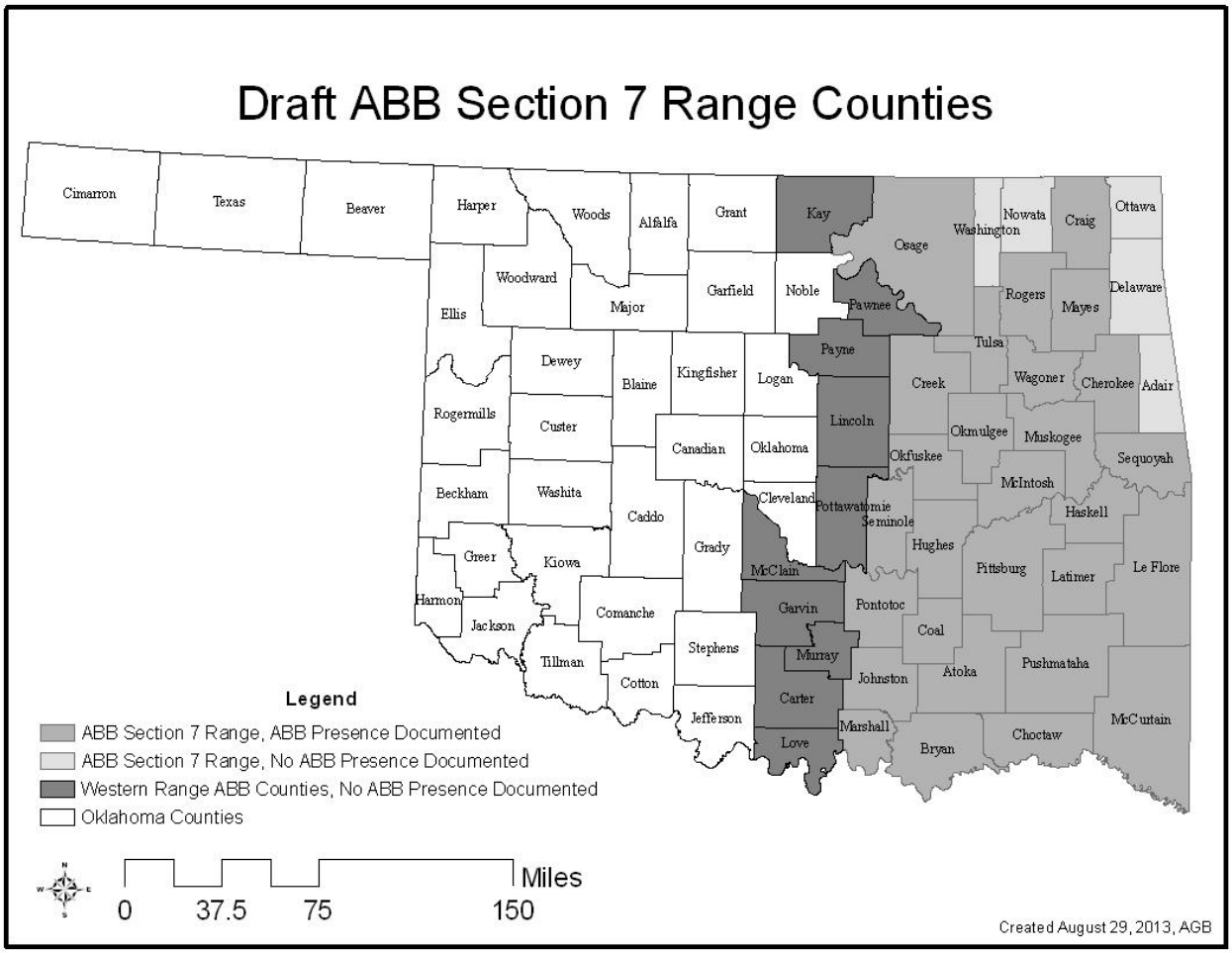
Angela Burgess, Anita Barstow, Chris Tanner, Daniel Fenner, Kevin Stubbs, Alisa Shull

Delineation of ABB Section 7 Range:

Currently selected at counties level. All counties selected if they met either of the following criteria:

1) Contained a "positive" survey where ABBs were identified
2) Borders a county where ABB surveys identified ABBs
    a. On the western edge of the range (since it is the W. border of their entire historical range), the range only includes counties that are within 30 km (max. ABB movement recorded by Jurzenski et al. 2011) of a positive survey.
    b. For projects proposed within these counties on the western range without a positive survey, we will likely recommend that surveys be conducted if they are within 30 km of a positive survey.





Research needs:

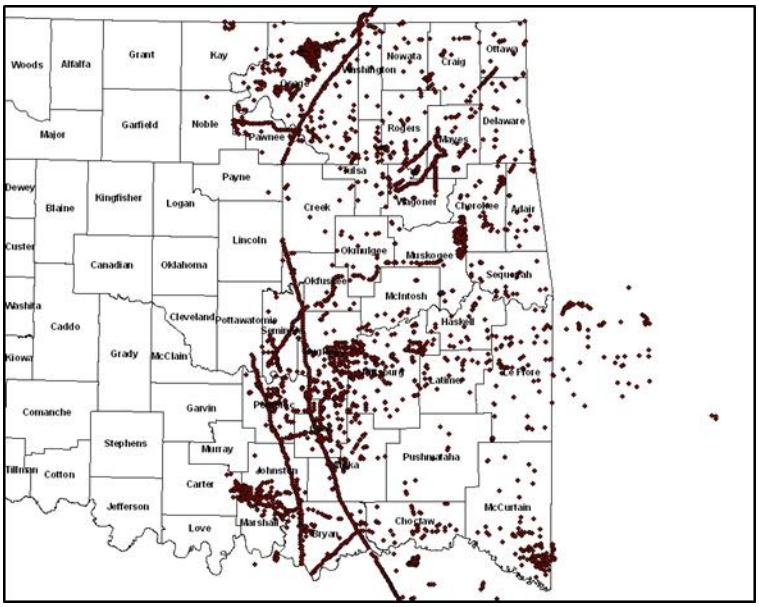
1) What is the proper delineation of Section 7 range?
    a. Systematic surveys for ABBs, especially in the outer limits of the range.

For GCP Planning Area:

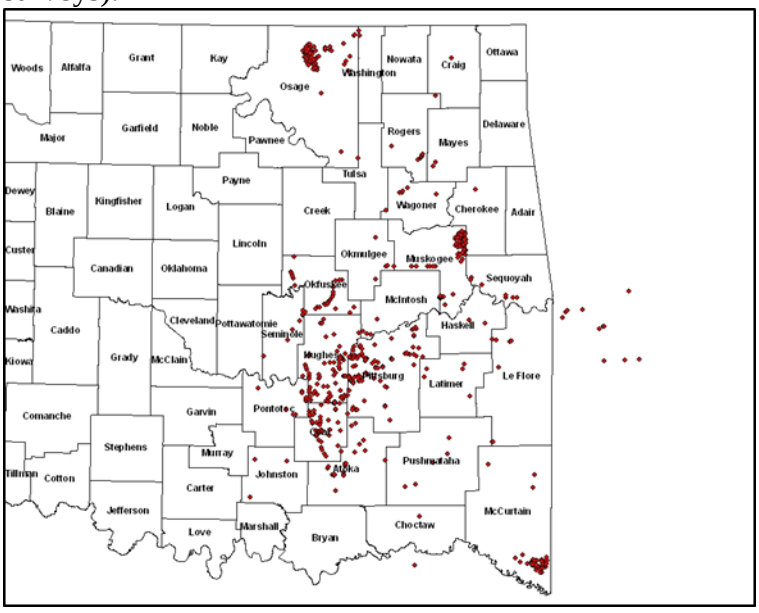
We recommend that we include all counties bordering a county where ABBs have been identified, even if in the Western range. This would also include Noble County, which is currently not included in the Section 7 range. This is to be more inclusive in case of range shifts, so additional amendments to the GCP would not be required if these counties are added.

Delineation of CPAs-

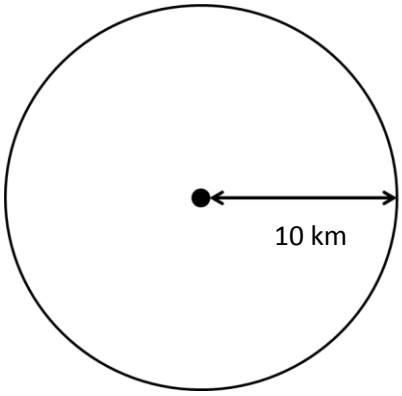
1) Using the presence/absence ABB surveys, we selected all ABB surveys conducted in the last 10 years.

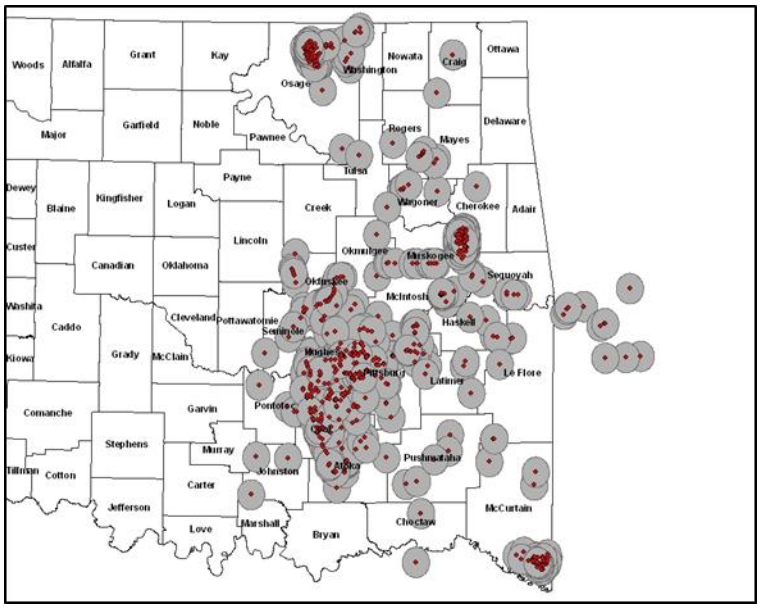


2) Of these surveys, we selected only surveys where ABBs were identified (positive surveys).

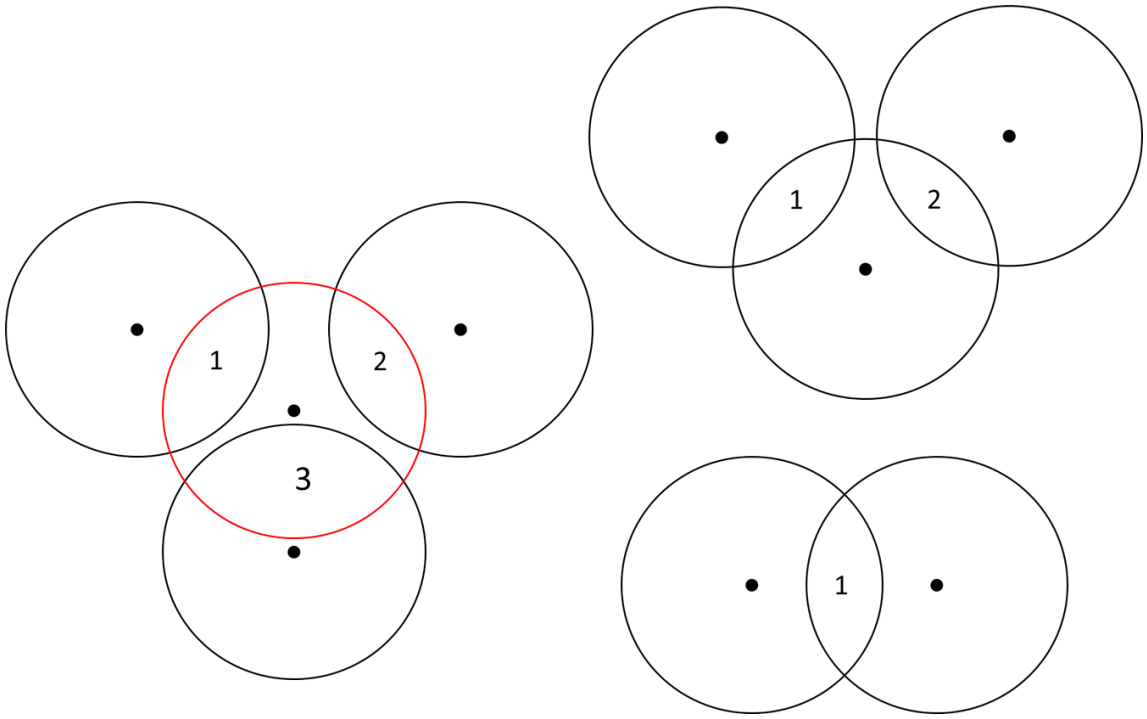


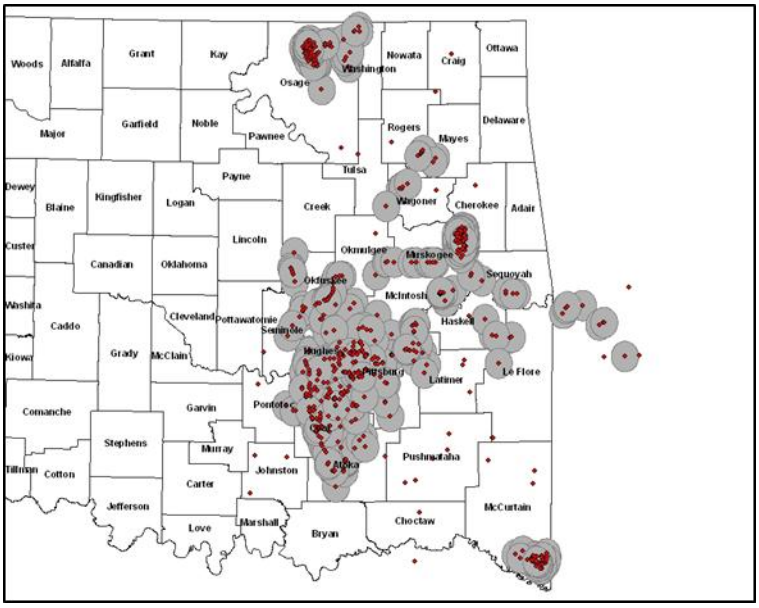
3) We created a circle (buffer) around each positive survey point location with a radius of 10 km, based on the maximum distance for an ABB recapture in Oklahoma (movement over 6 nights) (Creighton and Schnell 1998).



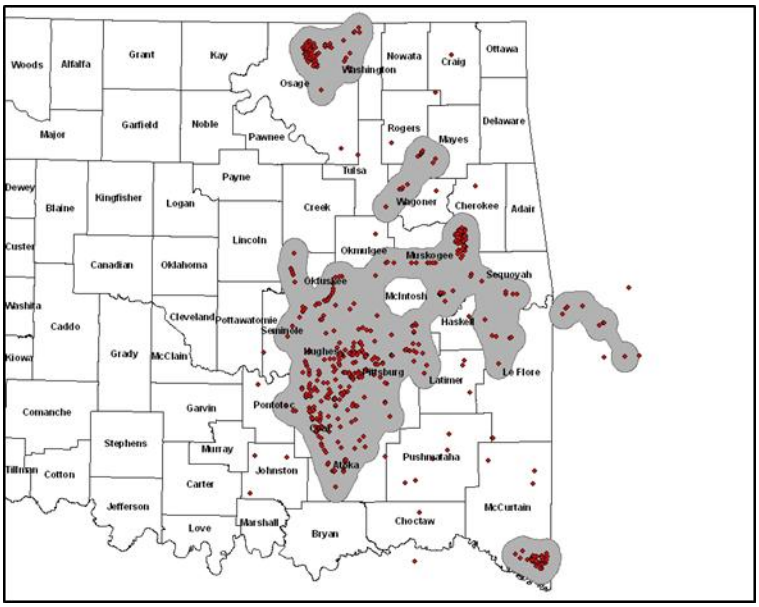


4) We identified and selected all buffers that intersected a minimum of 3 other buffers. This step was taken in an attempt to remove outlying positive surveys and to focus CPAs in areas with potentially higher ABB concentrations. In the below example, only the red buffer would be selected.

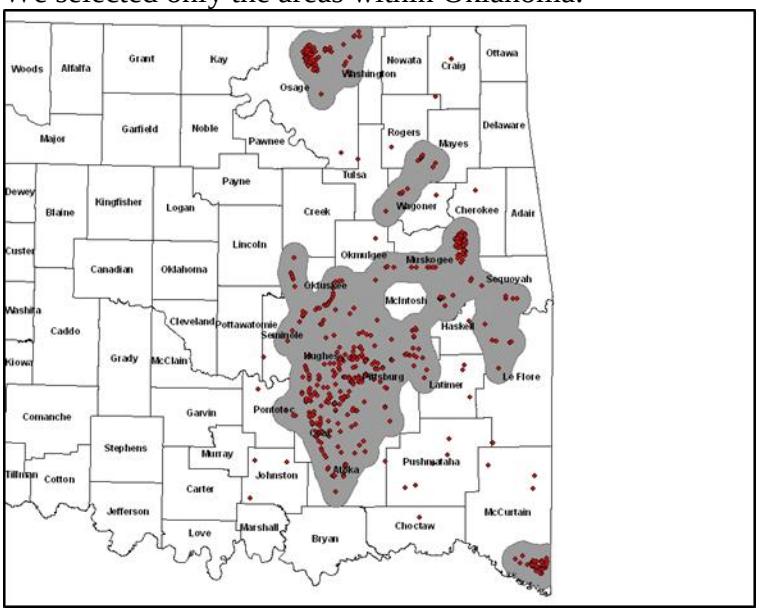




5) We combined the above selected buffers within a 10 km of each other into new polygons using the aggregate polygon tool in ArcMap.



6) We selected only the areas within Oklahoma.



7) CPAs will be re-evaluated in 3 years or when additional information becomes available.

Research needs:

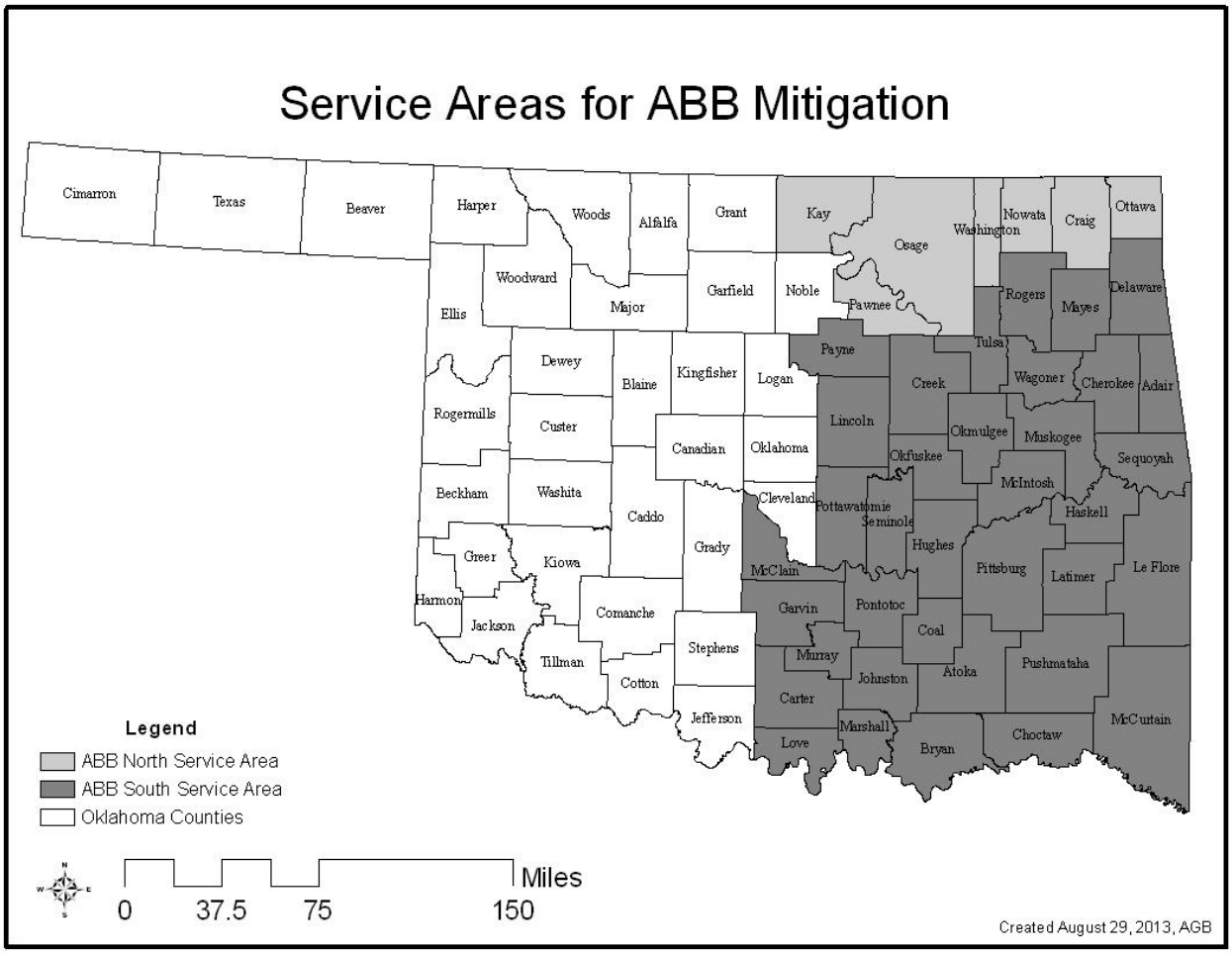
1) Is there a better method to select CPAs, such as interpolation of survey points?
2) Systematic surveys of CPAs (especially the area in McCurtain County) to determine densities, etc.

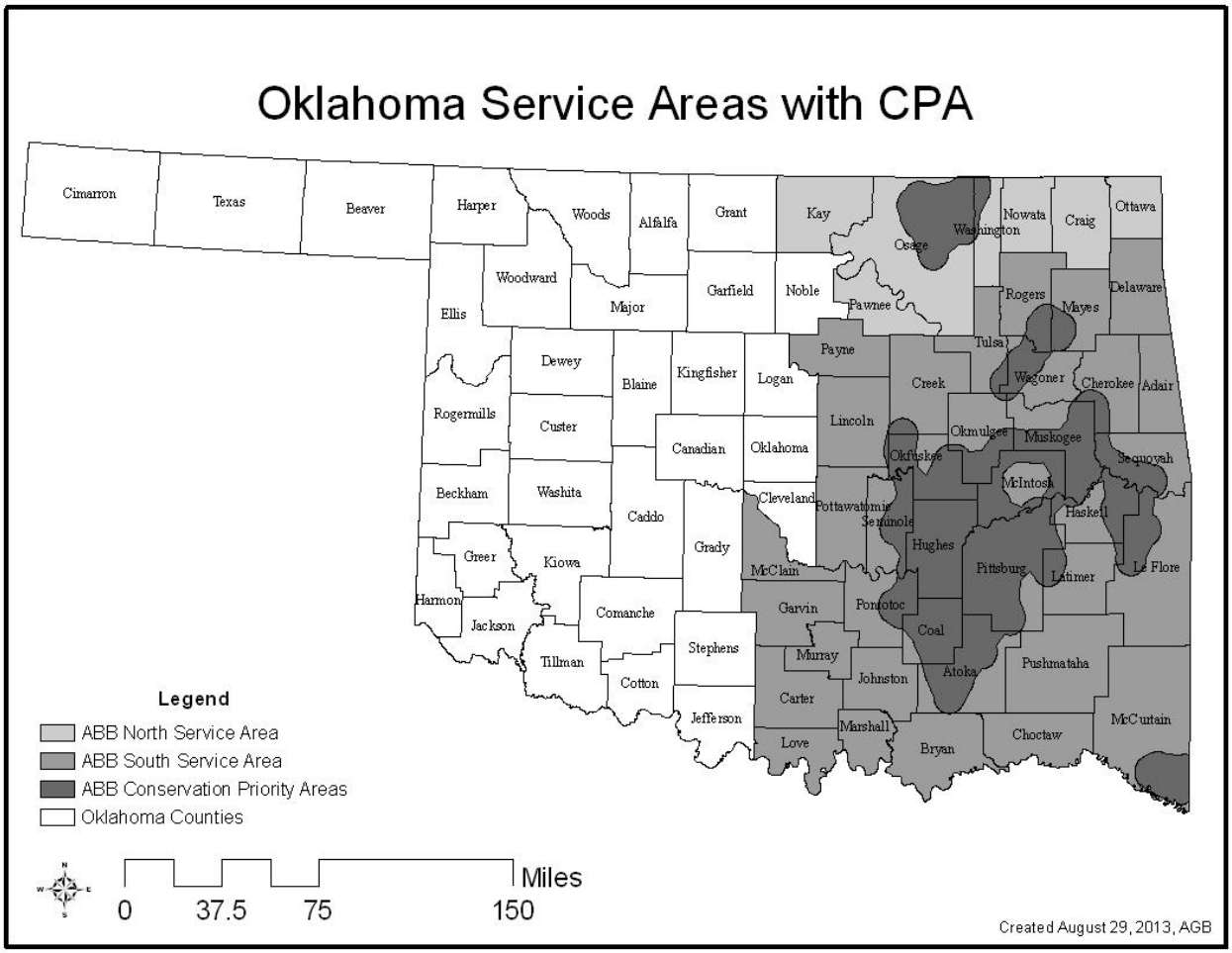
Service Areas for CPAs:

Because the Tallgrass Prairie metapopulation appears to be an important area for ABBs, and possibly separated from the more southern ABBs, we believed it would be important to focus conservation efforts in these areas. We believe dividing Oklahoma into 2 Service Areas, Northern and Southern, would focus conservation efforts in both areas. Projects should provide mitigation within the same service area as the impacts. If one service area has no available banks, mitigation can be purchased within the other service area. Within service areas, the Service recommends that mitigation take place as close to impacts as possible, but it is not required that bank credits be purchased at the nearest bank.

If it is determined that the northern service area is not large enough to allow conservation bank interest, we may consider having only one service area in Oklahoma instead of two.

While the area down in McCurtain County is also separated from the more northern areas, the Service is currently unsure of metapopulation stability in these areas, based on the previous surveys in 2005-2006 from the Weyerhauser HCP. Lack of data since then makes us hesitant to focus conservation effort solely on this area, though it may be a good location for banks given additional data.


Service Areas for ABB Mitigation
Cimarron
Texas
Beaver
Harper
Woods
Alfalfa
Grant
Kay
Osage
Washington
Nowata
Craig
Ottawa
Woodward
Major
Garfield
Noble
Pawnee
Rogers
Mayes
Delaware
Ellis
Dewey
Blaine
Kingfisher
Logan
Payne
Tulsa
Creek
Wagoner
Cherokee
Adair
Rogermills
Custer
Canadian
Oklahoma
Lincoln
Okmulgee
Muskogee
Sequoyah
Okfuskee
McIntosh
Beckham
Washita
Caddo
Grady
Cleveland
Pottawatomie
Seminole
Haskell
Hughes
Greer
Kiowa
McClain
Pittsburg
Latimer
Le Flore
Harmon
Jackson
Comanche
Garvin
Pontotoc
Coal
Stephens
Murray
Tillman
Cotton
Johnston
Atoka
Pushmataha
Carter
Jefferson
Marshall
Choctaw
McCurtain
Love
Bryan
Legend
ABB North Service Area
ABB South Service Area
Oklahoma Counties
Miles
0
37.5
75
150
Created August 29, 2013, AGB



Research needs:

1) How important is the Osage and McCurtain CPAs to the overall ABB population? Should we be focusing conservation mitigation in these areas/separating these Service areas?
    a. If so, how?
    b. Systematic surveys may show that these "populations" are connected.

Purpose of CPAs

1. Delineate areas of importance for ABBs
2. Delineate areas where impacts require higher levels of mitigation
3. Delineate areas where mitigation land should occur
4. Delineate areas where ABB surveys are likely less efficient (presence should be assumed instead of surveys)
    a. The Service will recommend assuming ABB presence within CPAs based on uncertainties in the current survey protocol (high probability of false negatives). This will be re-evaluated if:
        i. If statistics show that current survey methods are more reliable than we currently believe, or

ii. If survey methods are improved and statistically shown to be reliable

ABB Survey Protocol

Delineating timing of presence/absence surveys:

The ABBs are active in the summer months and bury themselves in the soil for the duration of the winter. When the nighttime ambient air temperature is consistently below 60°F (15.5°C), ABBs bury into the soil and become inactive (Kozol 1991, USFWS 1991, Creighton et al. 1993, Bedick et al. 1999). The length of the inactive period can fluctuate depending on temperature.

The ABB begin rearing broods soon after emergence from overwintering. During late May and early June ABBs (and potentially later depending on carrion availability and success) secure a mate and carcass for reproduction. Adults and larvae are dependent on carrion for food and reproduction. Adults lay eggs beside the buried carrion, which is used as a food source for larvae as they develop. The reproductive process from carcass burial to eclosure is about 48 to 79 days (approximately 7- 11 weeks) (Ratcliffe 1996, Kozol 1991, Bedick et al. 1999). Immature ABBs (tenerals) emerge in late summer, over-winter as adults, and comprise the breeding population the following summer (Kozol 1990b).

Because ABBs become less active below 60 degrees F, we recommend that to determine presence/absence of ABBs, surveys should begin following the 5th day with minimum temperatures above 60 degrees. We analyzed Oklahoma Mesonet stations within counties with ABB captures, and over the previous 10 years (2003-2012). On average, the 5th day with minimum temperatures above 60 degrees occurred on May 26. We recommend that as soon as a minimum temperature below 60 degrees occurs at the end of the summer, ABB presence/absence surveys should no longer be conducted. Using mesonet data, the last date where the minimum temperature was above 60 degrees was September 14.

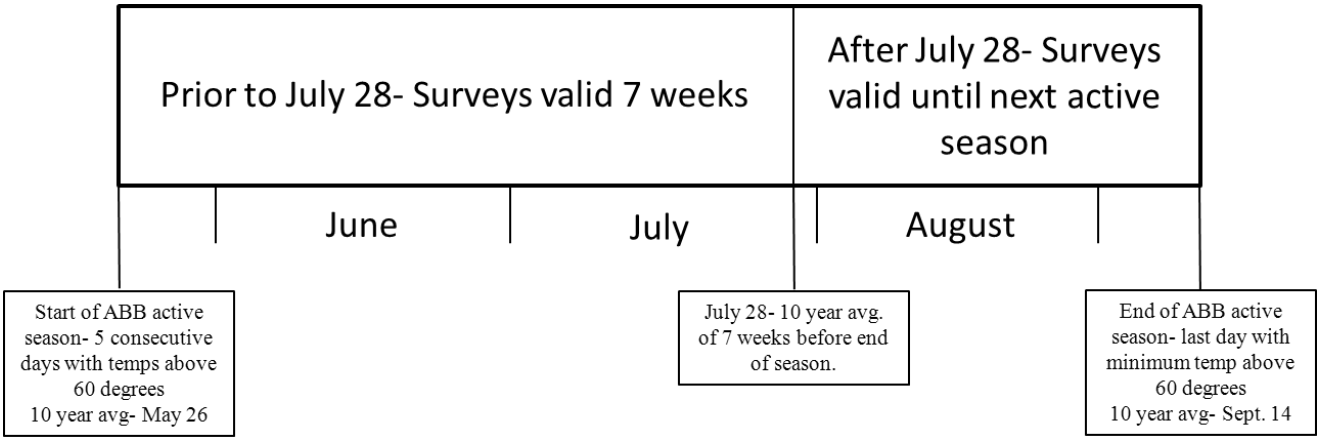
How long surveys should be considered valid:

The length a presence/absence survey should be considered "valid" varies based on the time period of the ABB active season in which it was conducted. Surveys conducted at the beginning of the ABB season would likely capture adult ABBs searching for carrion suitable for reproduction. Surveys conducted towards the end of the season would likely capture a mixture of adult and teneral (immature ABBs) that have emerged that season.

Due to potential movement of adults and tenerals into new areas later in the season, we recommend that surveys conducted in the beginning and middle of the season be considered valid for approximately 7 weeks. Seven weeks is based on the minimum time period for the reproductive process (48-79 days).

Since reproduction takes a minimum of 7 weeks, within 7 weeks of the end of the season, the Service believes that much of the reproduction would be complete ABBs would be less likely to move away from the area (or into new areas) at this point. Therefore, these surveys are valid through the inactive season until the start of the next active season. Since it is impossible to determine when each year's inactive season will begin, we chose the date that is, on average of 10 years, 7 weeks prior to the "end" of the active season (on average, the end of the active season occurs on September 14). That date is July 28. Therefore, all surveys conducted prior to July 28

will be considered valid for approximately 7 weeks, while those conducted after will be considered valid until the beginning of the following active season. Project proponents should time presence/absence surveys depending on the timeframe the activities potentially impacting ABBs would begin.



Locations where ABB presence/absence surveys are recommended:

Based on previous survey data, the Service believes that ABBs likely occupy ABB "suitable" areas within the CPAs and therefore recommends that activities disturbing ABB habitat within CPAs assume ABB presence.

For areas within the ABB range but outside the CPAs, additional data may be necessary to determine if ABBs occupy areas suitable for ABBs. Therefore, in these areas we recommend presence/absence surveys.

For projects proposed within counties on the western range without a positive survey, we will likely recommend that surveys be conducted if they are within 30 km (maximum distance of ABB movement) of a positive survey.

What positive/negative survey results mean for ABB occupancy:

Survey locations should be spaced assuming each survey has a radius of 0.8 km (0.5 miles). All areas farther than 10 km (6.2 miles) AND within 0.8 km of a valid negative survey may be considered "unoccupied" by the ABB.

Because ABBs in Oklahoma have been recorded to move up to 10 km in 6 nights (Creighton and Schnell 1998), all areas within 10 km of a valid, current survey documenting ABB presence should be considered "occupied." Assuming that every ABB may move and could potentially be impacted within the maximum distance recorded errs of the side of the species.

Surveys that do not identify ABBs, which have a risk of "false negatives" described above, have a smaller radius of effectiveness (0.8 km). This distance is based on the average recorded movement (Creighton and Schnell 1998) of ABBs in Oklahoma, as opposed to the maximum distance. This assumes that not every ABB will travel maximum distances to be captured, but

that if ABBs were in the area, they would likely travel the average distance recorded for ABBs and would have been identified if they had been there.

Survey effort modifications:

Increase 3 trap nights to 5 trap nights- based on recommendations in Bedick et al. 2004

Research Needs:

1) Analyze current percentage/risk of false negatives
2) Study potential improvements to survey protocol (time period, length of surveys, number of traps, new methodology)
3) Better information on factors impacting start and end of "active season"
4) How often/far do they move? How does this impact the probability of capture during presence/absence surveys?
5) In what weather conditions do they move most? In what weather conditions do they limit their movement to the point where presence/absence surveys would not be accurate? For example, is there a maximum temperature threshold that would reduce ABB activity to a point where presence/absence surveys are no longer useful? In NE, Bedick et al. found lower capture success when temperatures reached 24 degrees C (75 degrees F) and above. What amount of time with temperatures above 75 degrees would decrease activity enough that ABB presence detection is significantly lower? Do ABBs in OK have same decrease in movement as NE ABBs?
6) What is the timing of the highest amount of ABB activity (based on life cycle?)? When would be the best time period to do presence/absence surveys?
7) Are ABBs harder to capture at the end of the season? If so, is there a way to increase trap effort during this time period?
8) Survey Accuracy: Is there a way surveys would be more accurate/eliminate the need to assume presence in CPAs?
    a) Analyze current survey accuracy (risk of false negatives)
    b) Study potential improvements to survey accuracy (when surveys are conducted, length of surveys, number of traps, new methods-dogs)
9) Carrion availability- How does carrion availability on landscape impact results of ABB presence/absence surveys?

ABB Habitat

Because ABBs are considered habitat generalists and specific habitat requirements for all life stages are not clearly understood, we instead recommend ruling out places we believe ABBs would not occur. These "unsuitable" areas include:

1. Agricultural land that is tilled and where pesticides are utilized on at least an annual basis.

2. Land that is heavily grazed and compacted. (Pastures are predominated by short-grass species (e.g. Poa spp) and will be less than 2-3 inches tall or weedy shrubs/forbs in the grazed areas such as broomweed (e.g. Ampniachyris spp). Palatable tall grasses such as big bluestem (e.g. Andropogon gerardii) are sparse or non-existent. In such cases of

overgrazing, soil may be visible between plants in the stand, allowing erosion to occur, though in many circumstances overgrazed pastures have a greater non-palatable forb cover than sustainably grazed pastures.)

3. Land in an existing right-of-way/bar ditch along a roadway that is maintained through frequent mowing or herbicide. Frequent is defined as being mowed and/or sprayed and where vegetation is maintained at a height of 8 inches or less.

4. Land that has already been developed and no longer exhibits surficial topsoil, leaf litter, or vegetation.

5. Urban areas with maintained lawns, paved surfaces, roadways.

6. Stockpiled soil without vegetation.

7. Wetlands (defined as sites exhibiting hydric- soils and vegetation and/or wetland hydrology).

Research Needs:

1) Defining ABB habitat:
    a. Where is the ABB during breeding, non-breeding, inactive life cycle
    b. Where does the ABB not occur?

Consultation Process

For projects without federal nexus- Develop a form letter that includes the following:

1) Where to find information about ABB biology
2) Recommendations on ABB conservation measures, how to reduce the risk of take (i.e., surveys, reduce project footprint, etc.)
3) Options available to get take coverage- HCPs, GCP, find a federal nexus

If there are large groups of non-federal nexus projects that often need take coverage (i.e., transmission, wind, development), we could amend the GCP, develop a new one, or develop a template HCP.

For projects with a federal nexus- Develop a form letter that includes the following:

1) Where to find information about ABB biology
2) Recommendations on ABB conservation measures, how to reduce the risk of take (i.e., surveys, reduce project footprint, etc.)
3) Recommendation for the agency to complete a programmatic consultation for small projects/frequent actions that have cumulative impacts

If many federal agencies do not consult frequently with us to make a programmatic consultation worthwhile, or they do not want to do a programmatic consultation, we will use the following strategy to determine if we will concur with a NLAA or not. If they meet the following criteria, we can concur with NLAA:

1) All impacted areas are considered "unsuitable" for the ABB
2) Project areas outside the CPA with potentially suitable habitat should conduct a presence/absence survey to determine if ABBs are present in or near the project area. If negative, we will concur with NLAA. If positive, we cannot concur with NLAA?
3) Project areas inside the CPA with potentially suitable habitat should assume presence. Are there any types of projects that may cause take, but we would agree with an NLAA because of minor risk of impacts?

Mitigation Land

Requirements to become a Mitigation bank/permittee-responsible area:

Size: Mitigation lands must contain a minimum of 500 acres of suitable habitat for ABBs. The average distance between traps of recaptured ABBs has been recorded at approximately 0.5 miles (citation). Using 0.5 miles as a radius of movement, the average distance an individual ABB travels in the recorded timeframe may be viewed as 500 acres.

Location: Mitigation lands are accepted either of the following described areas:

1) Within an ABB Conservation Priority Area
2) Outside of an ABB Conservation Priority Area, if mitigation land developer can document and provide evidence to the Service that the area meets the requirements to become a Conservation Priority Area.
    a. Positive ABB surveys buffered by 10 km. Buffers overlapping 3 or more other positive ABB buffers would be considered "eligible" for inclusion as a CPA.

Documentation of ABBs: Must have valid surveys (within timeframes discussed in Survey Protocols) showing ABBs occur on site. Surveys should have a catch per unit effort of 0.37 ABBs/trapnight. This rate is based on the average catch per unit effort found within all CPAs (including positive and negative surveys) within the last 10 years, excluding surveys conducted at Camp Gruber. Determining and setting requirements for catch per unit effort for ABBs attempts to describe not only that ABBs occur in Mitigation Lands, but that they occur in above average rates compared to CPAs. Based on previous studies indicating relatively low recapture rates, the Service is assuming that most ABBs are new individuals (as opposed to capturing the same individual ABB numerous times at the same trap). However, the Service requests that surveys for mitigation lands mark ABBs according to current protocols and identify if there are any recaptures during the surveys. Because the data analyzed to determine the average did not exclude ABB recaptures, all ABBs can be used when calculating catch per unit effort for the mitigation land.

Surveys to document catch per unit effort should attempt to encompass the entire bank/land area. Traps should be spaced approximately 1 mile apart (with each trap having a 0.5 mile effective radius). Because of the circular shape of "effective trapping areas", the Service realizes it may be difficult to trap an area without having gaps or overlapping effective areas. However, traps should be set as to minimize overlap and gaps between effective areas. Gaps between trapping areas may exist- but not for more than 25% of the property.

Surveys can be conducted anytime during the ABB active season. They must have a minimum of 3 consecutive nights of trapping to calculate the catch per unit effort. (This differs from the 5-

night minimum of presence/absence surveys, as it is trying to detect the amount of ABBs as opposed to if they are present or not. Additionally, we are comparing this rate to rates previously calculated using a 3-night capture rate.) If an "invalid" (based on weather or disturbance) survey night occurs during the 3 consecutive nights of trapping, additional nights may be added to complete 3 total nights (i.e., 2 nights of valid surveys are conducted on June 1 and 2. On June 3 (The 3rd night), temperatures go below 60 degrees. Because it is considered "invalid", an additional night (June 4) may be added to reach the 3 consecutive night requirement). The nights of "invalid" surveys would not be incorporated into calculations for catch per unit effort. However, if there are 3 or more consecutive nights with "invalid" results, the 3 consecutive night minimum must be restarted (i.e., 2 nights of valid surveys on June 1 and 2, followed by 3 nights below 60 degrees on June 3, 4, and 5. Survey must start over at "night 1" for the survey effort to be considered valid).

Multiple surveys can be conducted within each active season, but the capture rate must be equal to or greater than 0.37 (10 year average in CPAs other than Camp Gruber) over 3 consecutive trapnights to the land to qualify as a Conservation Bank/Mitigation Land.

Once mitigation land is approved, ABBs should be annually surveyed at the same locations. Following the 3rd year of surveys, the 3-year average capture rate should be calculated annually. This annual average must be higher than the 10-year average capture rate (excluding Camp Gruber). If there are 3 consecutive years in which the 3-year average is below this capture rate, remedial actions may be required by the Service.

If a bank/mitigation land area is attempted to be established during what the Service believes is an "off" ABB year (drought or excessive rain), we may consider using the minimum 3 or 5- year capture rate over the last 10 years. This will be judged on a case by case basis.

Research Needs:

1) Determine if there is a better index of ABB use/abundance in an area
2) Determine if recovery goals indicate a change should be made in location or size of mitigation, change process

Carrion Removal Minimization Measures

Do we recommend removing carrion from project areas prior to implementation, assuming they have an ITP?

If so, how long prior to the start of the project?

What do they do with carrion they find?

Should they/can they examine for ABB presence?

Research needs:

1) What is the density of available carrion on the landscape?
2) Does carrion density impact ABB movement? If so, how?
3) How does removing carrion impact ABBs?
4) Are different types of carrion used during different periods of the active season?